

IPRenewal NPEmails

From: Waters, Roger M. [rwater1@entergy.com]
Sent: Monday, July 22, 2013 10:53 AM
To: Green, Kimberly
Subject: the InfoGram on the Clevis Insert Cap Screws
Attachments: AR2010-1804_10-Year_Reactor_Vessel_In-Service_Inspection.pdf

Kim,

Attached is the InfoGram on the Clevis Insert Cap Screws that we discussed on Friday's RAI clarification call. As discussed, this is related to Draft RAI 17.

Westinghouse has confirmed that the InfoGram does not contain proprietary information and, as such, may be placed on the docket.

Roger Waters
IPEC Licensing
914-254-7714

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Subject: the InfoGram on the Clevis Insert Cap Screws
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From: Waters, Roger M.

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"Green, Kimberly" <Kimberly.Green@nrc.gov>
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March 31, 2010

IG-10-1

REACTOR INTERNALS LOWER RADIAL SUPPORT CLEVIS INSERT CAP SCREW DEGRADATION

DESCRIPTION

During the March 2010 10-year in-service inspection (ISI) of the reactor vessel at D. C. Cook Nuclear Plant Unit 1, an anomaly was observed in the lower radial support clevis inserts. Figure 1 provides an overview of the radial support clevis insert configuration. At D. C. Cook Unit 1, each clevis insert features eight cap screws and two dowel pins which provide for retention of the insert. At a total of seven (of 48) cap screw locations, there was visual evidence that the cap screw head had detached from the shank. On one of the clevis dowel pins, the lock welds on the pin had broken and the pin was slightly rotated and displaced deeper into the insert. Reviews of video images from the previous 10-year ISI vessel inspection showed no indications of wear, fractures, or other anomalies with the clevis insert cap screws or dowel pins at any location.

Westinghouse is currently evaluating degradation mechanisms that could have contributed to the observed degradation. While not confirmed, the known susceptibility of Inconel X-750 to stress corrosion cracking and low temperature crack propagation is expected to be a contributor to the observed degradation.

In support of an operability assessment for D. C. Cook Unit 1, Westinghouse performed engineering evaluations of the as-found condition, including an evaluation of the potential for loose parts. The loose parts evaluation concluded that the separated cap screw heads will remain captured in the clevis insert counterbores and will not impact operation. However, lock bars at the degraded cap screw locations were observed to have experienced wear-related degradation; therefore, the potential for loose parts from the lock bars to affect other locations in the reactor vessel was evaluated. Westinghouse concluded that no significant degradation of mechanical components is expected as a result of the potential presence of loose parts from the lock bars in the primary system.

Westinghouse also performed a detailed structural evaluation of the as-found condition of the clevis inserts. The analysis demonstrated the ability of the structure to function as required to meet criteria for one additional fuel cycle with no immediate physical modifications required. Westinghouse recommended that an inspection be performed at the next refueling outage and that appropriate actions be taken then for permanent repairs.

Similar cap screws are used in the radial support clevis inserts at a number of Westinghouse-designed plants. Other than this occurrence at D. C. Cook Unit 1, Westinghouse is unaware of any other occurrences of clevis insert cap screw degradation. Based on the engineering evaluations performed to date, there are no safety or operability concerns to be communicated to the industry at the present time. Westinghouse is continuing to investigate the effects that design factors and plant operating conditions can have on the observed clevis insert cap screw degradation. Additional discussions on the issue will be held at the Pressurized Water Reactor Owners Group (PWROG) Materials Subcommittee meeting on April 20–22, 2010.

If you have any questions please contact Rob Taylor, taylorra@westinghouse.com, (412) 374-4215, or Cheryl Boggess, boggescl@westinghouse.com, (412) 374-4692.

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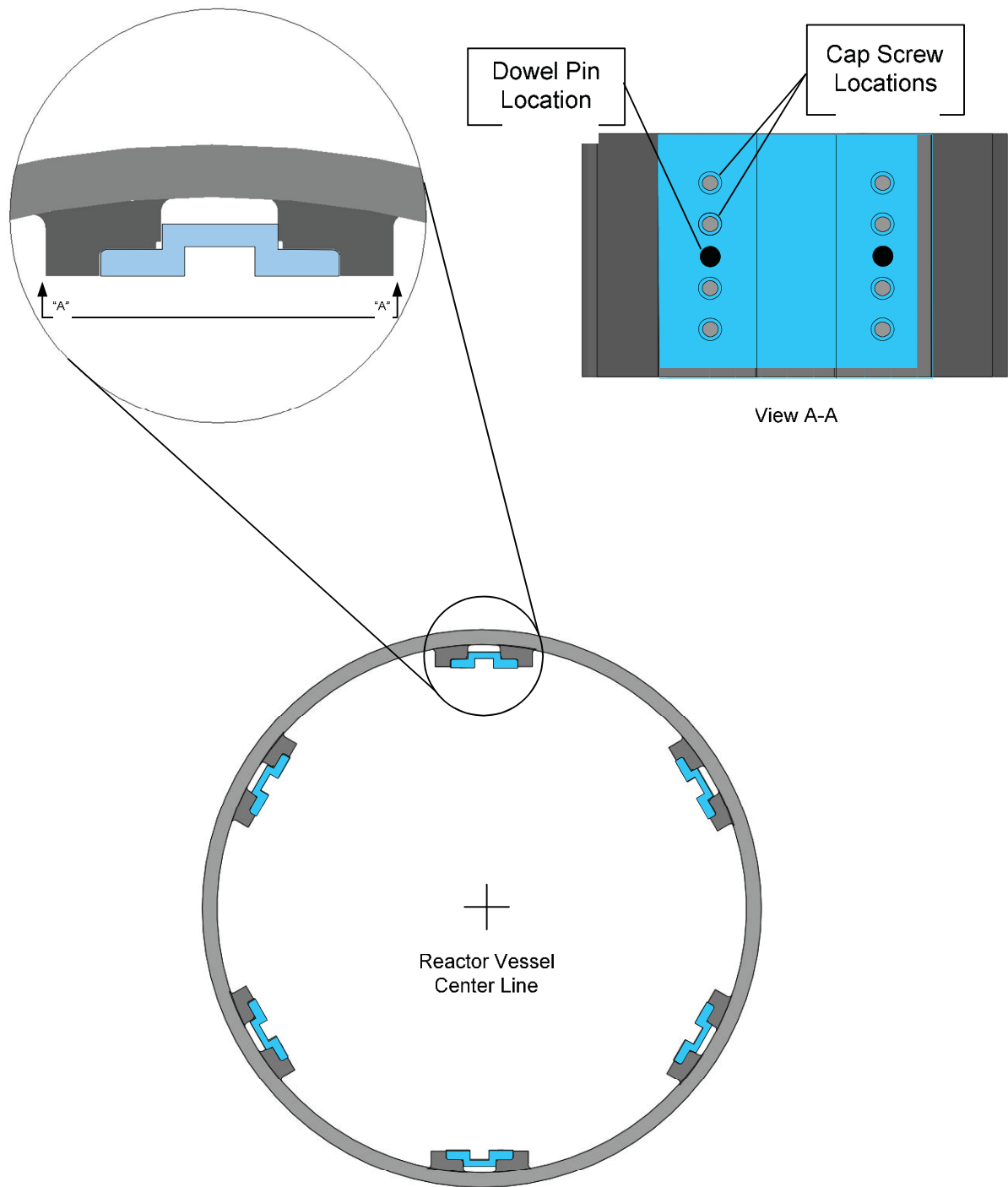


Figure 1. Radial Support Clevis Insert, Cap Screw and Dowel Pin Locations